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EXAMINER	
LEE, DAVID J	

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Please find below and/or attached an Office communication concerning this application or proceeding.

Office Action Summary	Application No.	Applicant(s)	
	10/004,095	ISLAM, MOHAMMED N.	
	Examiner	Art Unit	
	David Lee	2633	

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If the period for reply specified above is less than thirty (30) days, a reply within the statutory minimum of thirty (30) days will be considered timely.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

1)☐ Responsive to communication(s) filed on _____.

2a)☐ This action is **FINAL**. 2b)☒ This action is non-final.

3)☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

4)☒ Claim(s) 1-88 is/are pending in the application.

4a) Of the above claim(s) _____ is/are withdrawn from consideration.

5)☐ Claim(s) _____ is/are allowed.

6)☒ Claim(s) 1-88 is/are rejected.

7)☐ Claim(s) _____ is/are objected to.

8)☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

9)☐ The specification is objected to by the Examiner.

10)☒ The drawing(s) filed on 03 December 2001 is/are: a)☒ accepted or b)☐ objected to by the Examiner.

Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).

Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).

11)☒ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

12)☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).

a)☐ All b)☐ Some * c)☐ None of:

1.☐ Certified copies of the priority documents have been received.

2.☐ Certified copies of the priority documents have been received in Application No. _____.

3.☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

1) ☒ Notice of References Cited (PTO-892)
2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
3) ☒ Information Disclosure Statement(s) (PTO-1449 or PTO/SB/08) Paper No(s)/Mail Date 4/17/02.
4) ☐ Interview Summary (PTO-413) Paper No(s)/Mail Date. _____.
5) ☐ Notice of Informal Patent Application (PTO-152)
6) ☐ Other: _____.

DETAILED ACTION

Oath/Declaration

1. The oath or declaration is defective. A new oath or declaration in compliance with 37 CFR 1.67(a) identifying this application by application number and filing date is required. See MPEP §§ 602.01 and 602.02.

The oath or declaration is defective because:

It does not include the notary's signature, or the notary's signature is in the wrong place.

Claim Rejections - 35 USC § 112

2. The following is a quotation of the second paragraph of 35 U.S.C. 112:

> The specification shall conclude with one or more claims particularly pointing out and distinctly claiming the subject matter which the applicant regards as his invention.

3. Claims 49-57 are rejected under 35 U.S.C. 112, second paragraph, as being indefinite for failing to particularly point out and distinctly claim the subject matter which applicant regards as the invention.

Claim 49 recites the limitation "the star coupler" in line 7. There is insufficient antecedent basis for this limitation in the claim.

Claim Rejections - 35 USC § 102

4. The following is a quotation of the appropriate paragraphs of 35 U.S.C. 102 that form the basis for the rejections under this section made in this Office action:

> A person shall be entitled to a patent unless –
>
> (b) the invention was patented or described in a printed publication in this or a foreign country or in public use or on sale in this country, more than one year prior to the date of application for patent in the United States.

5. Claims 1-3, 9-13, 15, 17, 18, 21-25, 27, 28, 71-74, 76, 83, 84, 87, and 88 are rejected under 35 U.S.C. 102(b) as being anticipated by Arthurs et al. (US Patent No. 5,005,167), herein referred to as "Arthurs '167".

Regarding claims 1 and 71, Arthurs '167 teaches a router comprising: plurality of line cards (12-1 to 12-n of fig. 1; see also 12 of fig. 8) each operable to receive least one packet comprising an identifier associated with destination element external to the router (col. 5, lines 43-51), each line card comprising look-up table operable to facilitate routing the received packet toward the destination element based at least in part on the identifier (123, 124, and Transmission Control of fig. 8); a plurality of optical transmitters each associated with one of the line cards and operable generate at a specified wavelength an optical router signal comprising least portion of the packet received by the line card associated with that optical transmitter (22-1 to 22-N of fig. 1); and star switching fabric (21 of fig. 1) operable to receive a plurality of optical router signals from the plurality of optical transmitters and communicate to each of a plurality of tunable filters (26-1 to 26-N of fig. 1) substantially similar set at least some of the plurality of optical router signals (col. 4, lines 41-55); wherein each of the plurality of tunable filters is operable to selectively tune to wavelength of one of plurality optical router signals facilitate communication of the packet associated with that optical router signal toward the destination element (28 of fig. 9).

Regarding claims 2, 73, and 74, Arthurs '167 teaches that at least one of the plurality of optical transmitters comprises a fixed wavelength optical transmitter (22-1 to 22-N of fig. 1; see also 22 of fig. 8).

Regarding claim 3, Arthurs '167 teaches that the use of fixed wavelength optical transmitters comprises a primary mechanism for reducing collisions within the switching fabric (the use of fixed wavelength transmitters transmitting at different wavelengths reduces collisions since they are transmitting at different wavelengths; see also col. 3, lines 4-22).

Regarding claims 9, 83, and 84, Arthurs '167 teaches that each of the plurality of tunable filters is associated with one the plurality of line cards (fig. 1: each filter is coupled to the line cards through the star coupler) and wherein at least one of the plurality of tunable filters resides externally to its associated line card (filters 26 are external to line cards 12-n and 22-n).

Regarding claim 10, Arthurs '167 teaches that at least one the plurality of tunable filters coupled to the star switching fabric using a planar waveguide (27-1 of fig. 1).

Regarding claim 11, Arthurs '167 teaches that each of the plurality of tunable filters is associated with one of the plurality of line cards (fig. 1: each filter is coupled to the line cards through the star coupler), and wherein each of the plurality of optical transmitters and each of the plurality tunable filters resides on its associated line card (transmitters 22 reside on the line card 12 as shown in fig. 8, and filters 26 reside on its associated line card as shown in fig. 9).

Regarding claim 12, Arthurs '167 teaches that at least some of the plurality of line cards reside a first location (12-1 of fig. 1) and at least some of the plurality of line cards reside in a second location (12-3 of fig. 1) spatially separated from the first location and

coupled the first location through the star switching fabric (the line cards are spatially separated as shown in fig. 1 and are coupled through the star coupler).

Regarding claim 13, Arthurs '167 teaches that the first location and the second location each comprises separate rack of line cards (fig. 1: 12-1 and 12-2 can be considered a first rack and 12-3 and 12-N can be considered a second rack).

Regarding claims 15 and 76, Arthurs '167 teaches that the packet comprises an internet protocol packet (col. 5, lines 43-51).

Regarding claim 17, Arthurs '167 teaches that the identifier comprises an address or a tag identifying an element external to the router to which information in the packet is destined (col. 5, lines 43-51).

Regarding claims 18, 72, and 88, Arthurs '167 teaches a control circuitry operable to generate control signal (31 of figs. 8 and 9) based at least in part on an identifier associated with one of the packets and to communicate the control signal to at least one of the tunable filters to cause that tunable filter to tune a selected wavelength associated with one of the optical router signals (28 of fig. 9; see also col. 8, lines 56-67).

Regarding claim 21, Arthurs '167 teaches that the control signal received from the processor identifies an output optical link in a path destination element (the control signal causes the filter to tune to a selected wavelength and therefore identifies the destination/link) and wherein the controller is operable identify the selected filter associated with the output optical link based on the control signal (col. 8, lines 56-67).

Regarding claims 22 and 87, Arthurs '167 teaches that the control circuitry comprises plurality of control optical transmitters (Read Phase Logic of fig. 9 transmits signal 31), each associated with one the line cards (the Read Phase Logic is associated with the line cards through link 31) and each operable to generate an optical control signal for communication to the plurality of tunable filters through the star switching fabric (317 initiates receiver tuning current, 28 of fig. 9).

Regarding claim 23, Arthurs '167 teaches that the router is operable to facilitate multicast or broadcast operation by tuning multiple the plurality filters to same selected wavelength (col. 3, lines 23-40; see also, fig. 6).

Regarding claim 24, Arthurs '167 teaches an optical-to-electrical converter coupled to the tunable filter and operable facilitate electronic processing of the optical signal received from the tunable filter (144 of fig. 9).

Regarding claim 25, Arthurs '167 teaches that the star switching fabric comprises signal divider operable receive multiple wavelength signal and to communicate the multiple wavelength signal to plurality of output paths from the star switching fabric (21 of fig. 1: star couplers divide the power of a combined signal thereby replicating the combined signal to a plurality of outputs; see also col. 2, lines 54-60).

Regarding claim 27, Arthurs '167 teaches that the signal divider comprises a power divider (star couplers divide the power of a signal; see also col. 2, lines 54-60).

Regarding claim 28, Arthurs '167 teaches that the start switching fabric comprises a signal combiner operable to combine a plurality of wavelength signals into the multiple wavelength signal and to communicate the multiple wavelength signal to

the signal divider (star couplers combine at least 2 inputs and power splits the combined signal into at least two identical signals).

6. Claims 32 and 36 are rejected under 35 U.S.C. 102(b) as being anticipated by Arthurs et al. (US Patent No. 4,873,681), herein referred to as "Arthurs '681".

Regarding claim 32, Arthurs '681 teaches a line card (16-N of fig. 1) for use in a router and operable to receive a packet (on link 12-N of fig. 1) comprising an identifier associated with a destination element external the router (col. 2, lines 40-47), the line card comprising: a look-up table operable to facilitate generation of a control signal based at least in part on the identifier (40 of fig. 1); an optical transmitter operable to generate an optical router signal comprising at least a portion of the packet at a particular wavelength (45-N of fig. 1), the optical transmitter further operable to communicate the optical router signal to a star switching fabric (star switching fabric comprises 22 and 32 of fig. 1); and a tunable filter operable receive at least a portion of a plurality optical router signals from the star switching fabric (51-N of fig. 1) and to accept a selected optical router signal by tuning, response to a control signal generated by another line card, to a wavelength associated with the selected optical router signal (col. 4, lines 39-54).

Regarding claim 36, Arthurs '681 teaches that the control signal comprises an optical control signal operable to be communicated to the tunable filter through the star switching fabric (on link 36-N of fig. 1).

Claim Rejections - 35 USC § 103

7. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

> (a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negatived by the manner in which the invention was made.

8. Claims 4-8 and 78-82 are rejected under 35 U.S.C. 103(a) as being unpatentable over Arthurs '167 in view of Miller et al. (US Patent No. 6,790,698 B2).

Regarding claims 4, 5, 78, and 79, Arthurs '167 teaches the limitations of claims 1 and 71 but does not expressly disclose that the tunable filter comprises a FP MEMS device. However, FP MEMS filters are well known in the art. For example, Miller teaches the use of FP MEMS devices (fig. 3). One of ordinary skill in the art at the time of invention would have been motivated to use a FP based MEMS filter to have increased stability. Therefore it would have been obvious to one of ordinary skill in the art at the time of invention to use an FP MEMS filter.

Regarding claims 6-8 and 80-82, the combined invention of Arthurs '167 and Miller teaches the limitations of claims 5 and 79 but does not specifically disclose that the filter can tune to a selected wavelength in less than 100 nanoseconds. However, FP based MEMS filters can be configured and adjusted to tune to a wavelength in less than 100 nanoseconds. It would have been obvious to one of ordinary skill in the art at the time of invention to tune a wavelength in less than 100 nanoseconds in order to meet design specifications.

9. Claims 14, 38-40, and 85 are rejected under 35 U.S.C. 103(a) as being unpatentable over Arthurs '167 in view of Zhou et al. (US Pub. No. 2005/0025410 A1).

Regarding claims 14 and 85, Arthurs '167 teaches the limitations of claims 1 and 71 but does expressly disclose that the router is operable to communicate the optical routing signals from the optical transmitters to the tunable filters without converting the optical routing signals to an electronic form between the optical transmitters and the tunable filters. However, the practice of including express lanes in optical routing systems is well known in the art. For example, Zhou teaches a cascaded optical router incorporated express lanes (Express Lanes of fig. 15). One of ordinary skill in the art would have been motivated to use express lanes in order to increase space capacity and to reduce unnecessary or redundant management functions. Therefore it would have been obvious to one of ordinary skill in the art at the time of invention to communicate the optical routing signals from the optical transmitters to the tunable filters without converting the optical routing signals to an electronic form between the optical transmitters and the tunable filters.

Regarding claim 38, the combined invention of Arthurs '167 and Zhou teaches a router comprising: a first plurality of line cards residing in a first rack (22-1 and 22-2 of fig. 1 of Arthurs '167); a second plurality of line cards residing in a second rack physically separate from the first rack (22-3 and 22-N of fig. 1 of Arthurs '167), wherein each of the line cards of the first and second pluralities line cards comprises an optical transmitter operable to generate at a specified wavelength an optical router signal (22-1

to 22-N of fig. 1 of Arthurs '167); a star switching fabric operable to receive a plurality of optical router signals from the plurality of optical transmitters (21 of fig. 1 of Arthurs '167) and to communicate substantially similar sets of optical router signals to each plurality of tunable filters (26-N of fig. 1 of Arthurs '167), each tunable filter associated with one of the line cards and operable to selectively tune to wavelength one of the plurality of optical router signals received (28 of fig. 9 of Arthurs '167); wherein the star switching fabric operates as a switching fabric and as an interconnect between the racks line cards (21 of fig. 1 of Arthurs '167 interconnects the line cards) and wherein the router is operable to communicate an optical routing signal from an optical transmitter residing in the first rack to a tunable filter residing in the second rack without converting the optical routing signal to an electronic form between the optical transmitter and the tunable filter (Express Lanes of fig. 15 of Zhou).

Regarding claim 39, the combined invention of Arthurs '167 and Zhou teaches that the optical transmitters comprise a fixed wavelength transmitter (22-N of fig .1 of Arthurs '167).

Regarding claim 40, the combined invention of Arthurs '167 and Zhou teaches that the tunable filters reside externally to its associated line card (26-N is external to 12-N of fig. 1 of Arthurs '167).

10. Claim 41 is rejected under 35 U.S.C. 103(a) as being unpatentable over Arthurs '167 in view of Zhou and in further view of Arthurs '681.

Regarding claim 41, the combined invention of Arthurs '167 and O'Connor teaches the limitations of claim 38, but does not disclose that each of the filters resides on its associated line card. Arthurs '681 teaches a plurality of filters (51-N of fig. 1) residing on a respective line card (16-N of fig. 1). It would have been obvious to one of ordinary skill in the art at the time of invention to have filters on the line cards in order to filter any incoming signals.

11. Claim 42 is rejected under 35 U.S.C. 103(a) as being unpatentable over Arthurs '167 in view of Zhou and in further view of Knox et al. (US Patent No. 5,631,758).

Regarding claim 42, the combined invention of Arthurs '167 and Zhou teaches the limitations of claim 38 but does not expressly disclose that at least some of the plurality of optical transmitters each comprise: a modulator operable to receive from common bay equipment an unmodulated optical signal having a center wavelength and to modulate the received signal; wherein the common bay equipment is operable to generate using a single optical source a plurality of unmodulated optical signals each having a center wavelength. However, Knox teaches a modulator (207 of fig. 2) operable to receive from common bay equipment an unmodulated optical signal (from 201 of fig. 2) having a center wavelength (fig. 1a) and to modulate the received signal; wherein the common bay equipment is operable to generate using a single optical source a plurality of unmodulated optical signals each having a center wavelength ($\lambda 1$ – λn of fig. 2; see also figs. 1a and 1b). It would have been obvious to one of ordinary skill in the art at the time of invention to incorporate in at least some of the transmitters a

modulator operable to receive from common bay equipment an unmodulated optical signal having a center wavelength and to modulate the received signal wherein the common bay equipment is operable to generate using a single optical source a plurality of unmodulated optical signals each having a center wavelength in order to allow additional users to transmit data in and through the router.

12. Claims 16 and 77 are rejected under 35 U.S.C. 103(a) as being unpatentable over Arthurs '167 in view of O'Connor (US Pub. No. 2002/0085543 A1).

Regarding claims 16 and 77, Arthurs '167 teaches the limitations of claims 1 and 71 but does not expressly disclose that the packet comprises a MPLS packet. However, MPLS is an advanced routing technique well known in the art. For example, O'Connor teaches an advanced IP/SONET system wherein regular packets are converted into an MPLS format at edge nodes (paragraph 0008). One of ordinary skill in the art would have been motivated to use MPLS packets in order to reduce the amount of state information that needs to be maintained by a network, to determine the physical path through a network, to identify the quality of service requirements of paths through the network and to provide multiple paths through access networks. Therefore it would have been obvious to one of ordinary skill in the art at the time of invention to use MPLS packets.

13. Claims 19, 20, and 86 are rejected under 35 U.S.C. 103(a) as being unpatentable over Arthurs '167 in view of Labriola, II (US Patent No. 5,428,470).

Regarding claims 19 and 86, Arthurs teaches the limitations of claims 18 and 71 including the limitation that the control circuitry comprises, for each line card, a processor (143 of fig. 9) coupled to the tunable filter (26 of fig. 9). Arthurs does not specifically disclose that the processor is coupled to the filter by an Ethernet. However, the technique of coupling components using an Ethernet link is well known in the art. For example, Labriola teaches a network system utilizing Ethernet links (col. 3, lines 44-47). One of ordinary skill in the art would have been motivated to use Ethernet links for coupling in order to provide high speed and efficient operation. Therefore, it would have been obvious to one of ordinary skill in the art at the time of invention to couple the processor to the filter using an Ethernet link.

Regarding claim 20, Arthurs teaches that the control circuitry comprises a controller (141 of fig. 9) operable to receive the control signal from the processor and determine a schedule for communicating the control signal selected tunable filter (see also col. 8, lines 56-67).

14. Claim 26 is rejected under 35 U.S.C. 103(a) as being unpatentable over Arthurs '167 in view of Suchoski, Jr. et al. (US Patent No. 4,953,935).

Regarding claim 26, Arthurs '167 teaches the limitations of claim 25, but does not expressly disclose that the signal divider comprises a cascade of 1xn optical couplers. However, the use of cascaded optical couplers in star topology networks is well known in the art. For example, Suchoski teaches a coupler comprising a cascade of optical couplers (fig. 3). It would have been obvious to one of ordinary skill in the art at the time

of invention to use cascaded optical couplers in order to divide the signal in the appropriate amount of outputs.

15. Claims 29, 58, 59, 61, and 62 are rejected under 35 U.S.C. 103(a) as being unpatentable over Arthurs '167 in view of Bergmann (US Patent No. 5,140,655).

Regarding claim 29, Arthurs '167 teaches the limitations of claim 25 but does not expressly disclose that the signal divider is coupled to an optical amplifier. However, the use of optical amplifiers in star couplers is well known. For example, Bergmann teaches a star coupler using amplifiers (76 of fig. 6). It would have been obvious to one of ordinary skill in the art at the time of invention to amplify the signal in order to compensate for the loss caused from dividing the signal.

Regarding claim 58, Arthurs '167 teaches a switching core for use in a router, the switching core comprising: a signal combiner operable to combine a plurality of wavelength signals into a multiple wavelength signal (star couplers combine at least 2 inputs and power splits the combined signal into at least two identical signals); and a signal divider operable to receive a multiple wavelength signal (21 of fig. 1: star couplers divide the power of a combined signal thereby replicating the combined signal to a plurality of outputs; see also col. 2, lines 54-60) and to communicate the multiple wavelength signal toward a plurality filters, each filter associated with an output link from the router and operable to pass a particular wavelength signal of the multiple wavelength signal while rejecting at least some of the other wavelengths of the multiple wavelength signal (28 of fig. 9). Arthurs '167 does not specifically disclose amplifiers

operable to receive and amplify the multiple wavelength signal. However, the use of optical amplifiers in star couplers is well known. For example, Bergmann teaches a star coupler using amplifiers (76 of fig. 6). It would have been obvious to one of ordinary skill in the art at the time of invention to amplify the signal in order to compensate for the loss caused from dividing the signal.

Regarding claim 59, the combined invention of Arthurs '167 and Bergmann does not specifically teach that the combining is done with a wavelength division multiplexer. However, WDMs are well known in the art. Bergmann teaches a WDM to combine the signals (74 of fig. 6). It would have been obvious to one of ordinary skill in the art at the time of invention to use a WDM in order to combine the signals.

Regarding claim 61, the combined invention of Arthurs '167 and Bergmann teaches that the signal divider comprises a power splitter (col. 2, lines 54-60 of Arthurs '167).

Regarding claim 62, the combined invention of Arthurs '167 and Bergmann teaches that at least some of the filters comprise tunable filters operable to select a portion of the multiple wavelength signal for further transmission by tuning to a wavelength of the selected portion of the multiple wavelength signal (28 of fig. 9 of Arthurs '167).

16. Claims 30, 31, and 75 are rejected under 35 U.S.C. 103(a) as being unpatentable over Arthurs '167 in view of Knox et al. (US Patent No. 5,631,758).

Regarding claims 30 and 75, Arthurs '167 teaches the limitations of claims 1 and 71 but does not expressly disclose that at least some of the plurality of optical transmitters each comprise: a modulator operable to receive from common bay equipment an unmodulated optical signal having a center wavelength and to modulate the received signal; wherein the common bay equipment is operable to generate using a single optical source a plurality of unmodulated optical signals each having a center wavelength. However, Knox teaches a modulator (207 of fig. 2) operable to receive from common bay equipment an unmodulated optical signal (from 201 of fig. 2) having a center wavelength (fig. 1a) and to modulate the received signal; wherein the common bay equipment is operable to generate using a single optical source a plurality of unmodulated optical signals each having a center wavelength ($\lambda 1 - \lambda n$ of fig. 2; see also figs. 1a and 1b). It would have been obvious to one of ordinary skill in the art at the time of invention to incorporate in at least some of the transmitters a modulator operable to receive from common bay equipment an unmodulated optical signal having a center wavelength and to modulate the received signal wherein the common bay equipment is operable to generate using a single optical source a plurality of unmodulated optical signals each having a center wavelength in order to allow additional users to transmit data in and through the router.

Regarding claim 31, the combined invention of Arthurs '167 and Knox teaches that the common bay equipment comprises: a modelocked pulse source (201 of fig. 2) operable to generate a plurality of optical pulses (col. 4, lines 20-23); and a continuum generator operable to broaden the spectrum of the plurality of optical pulses into an

approximate spectral continuum of optical pulses (col. 8, lines 33-59; also, amplification can be considered to broaden the pulse spectrum; see also figs. 12a-12f). The combined invention does not expressly disclose a signal splitter operable to generate from the approximate continuum the plurality of unmodulated optical signals each comprising a center wavelength. However, the combined invention teaches a signal splitter (211 of fig. 2) to split the signal after it has been modulated. It would have been obvious to one of ordinary skill in the art at the time of invention to split the signal before modulation and to have a plurality of modulators to modulate each split signal.

17. Claims 43-45 and 47 are rejected under 35 U.S.C. 103(a) as being unpatentable over Arthurs '167.

Regarding claim 43, Arthurs '167 teaches a router comprising: a plurality of line cards (12-1 to 12-N of fig. 1) each operable to receive at least one packet comprising an identifier associated with a destination element external to the router (on link 16-N of fig. 1), a plurality optical transmitters each associated with one of the line cards and operable to generate at a specified wavelength an optical router signal comprising at least a portion of the packet received by the associated the line card (22-1 to 22-N of fig. 1); a star switching fabric operable to receive a plurality of optical router signals from at least some of the plurality optical transmitters (21 of fig. 1) and communicate substantially similar sets of optical router signals each of a plurality of tunable filters (26-1 to 26-N of fig. 1; col. 4, lines 41-55), wherein each filter is associated with a separate output optical link (18-1 to 18-N of fig. 1) and each filter is operable selectively tune to a

wavelength of one of the plurality of optical router signals to facilitate communication of the packet associated with that optical router signal from that filter toward destination element associated with that packet (28 of fig. 9). Arthurs '167 does not specifically teach that the filters are tunable to the switching fabric. However, it is well known in the art to integrate filters with switching fabrics. One of ordinary skill in the art would have been motivated to integrate the filters with the switching fabric in order to decrease transmission loss through the elimination of fibers 27-1 to 27-N of fig. 1, and thereby resulting in a more compact router. Therefore it would have been obvious to one of ordinary skill in the art at the time of invention to integrate the filters with the switching fabric.

Regarding claim 44, Arthurs '167 teaches that at least one of the plurality of optical transmitters comprises a fixed wavelength optical transmitter (22-1 to 22-N of fig. 1; see also 22 of fig. 8).

Regarding claim 45, Arthurs '167 teaches that at least one of the plurality optical transmitters resides externally to its associated line card (12-1 and 22-1 of fig. 1).

Regarding claim 47, Arthurs '167 teaches that the packet comprises an internet protocol packet (col. 5, lines 43-51).

18. Claim 46 is rejected under 35 U.S.C. 103(a) as being unpatentable over Arthurs '167 in view of Knox et al.

Regarding claim 46, Arthurs '167 teaches the limitations of claim 43 but does not expressly disclose that at least some of the plurality of optical transmitters each

comprise: a modulator operable to receive from common bay equipment an unmodulated optical signal having a center wavelength and to modulate the received signal; wherein the common bay equipment is operable to generate using a single optical source a plurality of unmodulated optical signals each having a center wavelength. However, Knox teaches a modulator (207 of fig. 2) operable to receive from common bay equipment an unmodulated optical signal (from 201 of fig. 2) having a center wavelength (fig. 1a) and to modulate the received signal; wherein the common bay equipment is operable to generate using a single optical source a plurality of unmodulated optical signals each having a center wavelength ($\lambda 1 - \lambda n$ of fig. 2; see also figs. 1a and 1b). It would have been obvious to one of ordinary skill in the art at the time of invention to incorporate in at least some of the transmitters a modulator operable to receive from common bay equipment an unmodulated optical signal having a center wavelength and to modulate the received signal wherein the common bay equipment is operable to generate using a single optical source a plurality of unmodulated optical signals each having a center wavelength in order to allow additional users to transmit data in and through the router.

19. Claims 48, 64, and 67-69 are rejected under 35 U.S.C. 103(a) as being unpatentable over Arthurs '167 in view of O'Connor.

Regarding claim 48, Arthurs '167 teaches the limitations of claim 43 but does not expressly disclose that the packet comprises a MPLS packet. However, the use of MPLS packets is well known in the art. For example, O'Connor teaches an advanced

IP/SONET system wherein regular packets are converted into an MPLS format at edge nodes (paragraph 0008). One of ordinary skill in the art would have been motivated to use MPLS packets in order to reduce the amount of state information that needs to be maintained by a network, to determine the physical path through a network, to identify the quality of service requirements of paths through the network and to provide multiple paths through access networks. Therefore it would have been obvious to one of ordinary skill in the art at the time of invention to use MPLS packets.

Regarding claim 64, the combined invention of Arthurs '167 and O'Connor teaches a router, comprising: a plurality of line cards (12-N of fig. 1 of Arthurs '167) each operable to receive at least one Multiple Protocol Label Switching (MPLS) packet (paragraph 0008 of Bergmann), each line card operable to perform label switching to facilitate routing the received packet toward a destination element (paragraph 0008 of Bergmann; and see also Transmission Control of fig. 8 of Arthurs '167); a plurality of optical transmitters each associated with one of the line cards and operable to generate at a particular wavelength an optical router signal comprising at least a portion of the packet received by the line card associated with that optical transmitter (22-N of fig. 1 of Arthurs '167); and a star switching fabric operable to receive a plurality of optical router signals from the plurality of optical transmitters (21 of fig. 1) and to communicate a substantially similar set of optical router signals to each of a plurality of filters (26-N of fig. 1), each filter associated with a separate output link from the router and operable to pass a particular wavelength toward the associated output link from the router (18-N of fig. 1).

Regarding claim 67, the combined invention of Arthurs '167 and O'Connor teaches that the filters comprise a tunable filter (26-N of fig. 1 of Arthurs '167).

Regarding claim 68, the combined invention of Arthurs '167 and O'Connor teaches that the transmitters comprises a fixed wavelength transmitter (22-N of fig. 1 of Arthurs '167).

Regarding claim 69, the combined invention of Arthurs '167 and O'Connor teaches that at least one of the plurality of filters resides externally to all of the line cards (26 resides externally to 12).

20. Claims 65 and 70 are rejected under 35 U.S.C. 103(a) as being unpatentable over Arthurs '167 in view of O'Connor and in further view of Arthurs '681.

Regarding claim 65, the combined invention of Arthurs '167 and O'Connor teaches the limitations of claim 64 but does not disclose that the signals are generated by tunable optical transmitters. However the use of tunable optical transmitters is well known in the art. For example, Arthurs '681 teaches the use of tunable optical transmitters in a switching core (45-N of fig. 1). It would have been obvious to one of ordinary skill in the art at the time of invention to use a tunable transmitter in order to have the ability to transmit different wavelengths.

Regarding claim 70, the combined invention of Arthurs '167 and O'Connor teaches the limitations of claim 64, but does not disclose that each of the filters resides on a respective one of the plurality of line cards. Arthurs '681 teaches a plurality of filters (51-N of fig. 1) residing on a respective line card (16-N of fig. 1). It would have

been obvious to one of ordinary skill in the art at the time of invention to have filters on the line cards in order to filter any incoming signals.

21. Claim 66 is rejected under 35 U.S.C. 103(a) as being unpatentable over Arthurs '167 in view of O'Connor and in further view of Knox et al.

Regarding claim 66, the combined invention of Arthurs '167 and O'Connor teaches the limitations of claim 64 but does not expressly disclose that at least some of the plurality of optical transmitters each comprise: a modulator operable to receive from common bay equipment an unmodulated optical signal having a center wavelength and to modulate the received signal; wherein the common bay equipment is operable to generate using a single optical source a plurality of unmodulated optical signals each having a center wavelength. However, Knox teaches a modulator (207 of fig. 2) operable to receive from common bay equipment an unmodulated optical signal (from 201 of fig. 2) having a center wavelength (fig. 1a) and to modulate the received signal; wherein the common bay equipment is operable to generate using a single optical source a plurality of unmodulated optical signals each having a center wavelength ($\lambda 1$ – λn of fig. 2; see also figs. 1a and 1b). It would have been obvious to one of ordinary skill in the art at the time of invention to incorporate in at least some of the transmitters a modulator operable to receive from common bay equipment an unmodulated optical signal having a center wavelength and to modulate the received signal wherein the common bay equipment is operable to generate using a single optical source a plurality

of unmodulated optical signals each having a center wavelength in order to allow additional users to transmit data in and through the router.

22. Claims 49-51, 53, 55, and 56 are rejected under 35 U.S.C. 103(a) as being unpatentable over Arthurs '167 in view of Lewis (6,751,369 B1).

Regarding claim 49, Arthurs '167 teaches a switching core for use in router (10 of fig. 1), the switching core comprising: a star switching fabric (21 of fig. 1) operable to receive plurality of input optical router signals each comprising a different wavelength (λ_1 to λ_N), at least some optical router signals carrying packet associated with a destination element external to the router (col. 5, lines 45-51), wherein the star coupler is operable generate plurality of output optical router signals each comprising substantially similar set of at least some the plurality of input optical router signals (col. 4, lines 41-55); and plurality of tunable filters coupled to the star switching fabric (26-1 to 26-N of fig. 1), each tunable filter associated with a line card (the filters are coupled to line cards 12) and operable receive one of the output optical router signals and select portion of the output optical router signal by tuning to a wavelength of the selected portion of the output optical router signal (28 of fig. 9). Arthur '167 does not teach that the filters are coupled to the line cards through a multi-mode fiber. However, it is well known in the art to use multi-mode fibers in switching cores to couple components together. For example, Lewis teaches a switching core that can incorporate multi-mode fibers (col. 4, lines 11-12). One of ordinary skill in the art would have been motivated to couple the line cards to the filters using a multi-mode fiber in order to reduce losses

induced by any fiber bends. Therefore it would have been obvious to one of ordinary skill in the art at the time of invention to couple the components using a multi-mode fiber.

Regarding claim 50, the combined invention of Arthurs '167 and Lewis teaches that at least one of the plurality of input optical router signals is generated by a fixed wavelength optical transmitter within the router (22-1 of fig. 1 of Arthurs '167).

Regarding claim 51, the combined invention of Arthurs '167 and Lewis teaches that the packet comprises an internet protocol packet (col. 5, lines 43-51).

Regarding claim 53, the combined invention of Arthurs '167 and Lewis teaches that the star switching fabric comprises signal divider operable receive multiple wavelength signal and to communicate the multiple wavelength signal to plurality of output paths from the star switching fabric (21 of fig. 1: star couplers divide the power of a combined signal thereby replicating the combined signal to a plurality of outputs; see also col. 2, lines 54-60).

Regarding claim 55, the combined invention of Arthurs '167 and Lewis teaches that the signal divider comprises a power divider (star couplers divide the power of a signal; see also col. 2, lines 54-60).

Regarding claim 56, the combined invention of Arthurs '167 and Lewis teaches that the start switching fabric comprises a signal combiner operable to combine a plurality of wavelength signals into the multiple wavelength signal and to communicate the multiple wavelength signal to the signal divider (star couplers combine at least 2 inputs and power splits the combined signal into at least two identical signals).

23. Claim 52 is rejected under 35 U.S.C. 103(a) as being unpatentable over Arthurs '167 in view of Lewis, and in further view of O'Connor.

Regarding claim 52, Arthurs '167 teaches the limitations of claim 49 but does not expressly disclose that the packet comprises a MPLS packet. However, the use of MPLS packets is well known in the art. For example, O'Connor teaches an advanced IP/SONET system wherein regular packets are converted into an MPLS format at edge nodes (paragraph 0008). One of ordinary skill in the art would have been motivated to use MPLS packets in order to reduce the amount of state information that needs to be maintained by a network, to determine the physical path through a network, to identify the quality of service requirements of paths through the network and to provide multiple paths through access networks. Therefore it would have been obvious to one of ordinary skill in the art at the time of invention to use MPLS packets.

24. Claim 54 is rejected under 35 U.S.C. 103(a) as being unpatentable over Arthurs '167 in view of Lewis and in further view of Suchoski, Jr. et al.

Regarding claim 54, the combined invention of Arthurs '167 and Lewis teaches the limitations of claim 53, but does not expressly disclose that the signal divider comprises a cascade of 1xn optical couplers. However, the use of cascaded optical couplers in star topology networks is well known in the art. For example, Suchoski teaches a coupler comprising a cascade of optical couplers (fig. 3). It would have been

obvious to one of ordinary skill in the art at the time of invention to use cascaded optical couplers in order to divide the signal in the appropriate amount of outputs.

25. Claim 57 is rejected under 35 U.S.C. 103(a) as being unpatentable over Arthurs '167 in view of Lewis and in further view of Bergmann.

Regarding claim 57, the combined invention of Arthurs '167 and Lewis teaches the limitations of claim 53 but does not expressly disclose that the signal divider is coupled to an optical amplifier. However, the use of optical amplifiers in star couplers is well known. For example, Bergmann teaches a star coupler using amplifiers (76 of fig. 6). It would have been obvious to one of ordinary skill in the art at the time of invention to amplify the signal in order to compensate for the loss caused from dividing the signal.

26. Claim 60 is rejected under 35 U.S.C. 103(a) as being unpatentable over Arthurs '167 in view of Bergmann and in further view of Suchoski.

Regarding claim 60, the combined invention of Arthurs '167 and Bergmann teaches the limitations of claim 58, but does not expressly disclose that the signal divider comprises a cascade of 1xn optical couplers. However, the use of cascaded optical couplers in star topology networks is well known in the art. For example, Suchoski teaches a coupler comprising a cascade of optical couplers (fig. 3). It would have been obvious to one of ordinary skill in the art at the time of invention to use cascaded optical couplers in order to divide the signal in the appropriate amount of outputs.

27. Claim 63 is rejected under 35 U.S.C. 103(a) as being unpatentable over Arthurs '167 in view of Bergmann and in further view of Arthurs '681.

Regarding claim 63, the combined invention of Arthurs '167 and Bergmann teaches the limitations of claim 58 but does not disclose that the signals are generated by tunable optical transmitters. However the use of tunable optical transmitters is well known in the art. For example, Arthurs '681 teaches the use of tunable optical transmitters in a switching core (45-N of fig. 1). It would have been obvious to one of ordinary skill in the art at the time of invention to use a tunable transmitter in order to have the ability to transmit different wavelengths.

28. Claims 33 and 34 are rejected under 35 U.S.C. 103(a) as being unpatentable over Arthurs '681.

Regarding claim 33, Arthurs '681 teaches the limitations of claim 32 but does not expressly disclose that the transmitter (45-N of fig. 1) can be a fixed wavelength transmitter. However, fixed wavelength transmitters are well known in the art (67-N of fig. 1). One of ordinary skill in the art would have been motivated to use a fixed wavelength transmitter in replace of the tunable transmitter if only a single wavelength needed to be transmitted, resulting in a decrease in component cost. Therefore it would have been obvious to one of ordinary skill in the art at the time of invention to use a fixed wavelength transmitter in the line card of Arthurs '681.

Regarding claim 34, Arthurs '681 teaches that the optical transmitter comprises an integrated modulator (a modulator is integrated into the transmitter in order to modulate the signals from electrical to optical).

29. Claim 35 is rejected under 35 U.S.C. 103(a) as being unpatentable over Arthurs '681 in view of Labriola.

Regarding claim 35, Arthurs teaches the limitations of claim 32 including the limitation that the control signal comprises an electronic control signal operable to be communicated to the tunable filter (on link 58 of fig. 1). Arthurs does not specifically disclose that the link is an Ethernet. However, the technique of coupling components using an Ethernet link is well known in the art. For example, Labriola teaches a network system utilizing Ethernet links (col. 3, lines 44-47). One of ordinary skill in the art would have been motivated to use Ethernet links for coupling in order to provide high speed and efficient operation. Therefore, it would have been obvious to one of ordinary skill in the art at the time of invention to transmit the control signal over an Ethernet link.

30. Claim 37 is rejected under 35 U.S.C. 103(a) as being unpatentable over Arthurs '681 in view of Knox et al.

Regarding claim 37, Arthurs teaches the limitations of claim 32 but does not expressly disclose that the optical transmitter comprises: a modulator operable to receive from common bay equipment an unmodulated optical signal having a center wavelength and to modulate the received signal; wherein the common bay equipment is

operable to generate using a single optical source a plurality of unmodulated optical signals each having a center wavelength. However, Knox teaches a modulator (207 of fig. 2) operable to receive from common bay equipment an unmodulated optical signal (from 201 of fig. 2) having a center wavelength (fig. 1a) and to modulate the received signal; wherein the common bay equipment is operable to generate using a single optical source a plurality of unmodulated optical signals each having a center wavelength ($\lambda 1 - \lambda n$ of fig. 2; see also figs. 1a and 1b). It would have been obvious to one of ordinary skill in the art at the time of invention to incorporate in the transmitter a modulator operable to receive from common bay equipment an unmodulated optical signal having a center wavelength and to modulate the received signal wherein the common bay equipment is operable to generate using a single optical source a plurality of unmodulated optical signals each having a center wavelength in order to allow additional users to transmit data in and through the router.

31. Any inquiry concerning this communication or earlier communications from the examiner should be directed to David Lee whose telephone number is (571) 272-2220. The examiner can normally be reached on Monday - Friday, 9:00 am - 5:30pm.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Jason Chan can be reached on (571) 272-3022. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

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